



Emergence of the Largest Solar Power Plant in Karnataka – A Microscopic Analysis¹

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Abstract

This paper with a specific focus on the largest solar producing plant explores many interrelated issues at field level. This project unlike many other developmental projects did not attract resistance from the local communities. Every effort was made to convince the land holders to agree for a long term contract termed to be the one of the successful models particularly in solar energy sector. At the same time the field level investigation reveals that farmers are having some apprehension over the long term contract. It is not an exaggeration to reveal that the project brought out significant economic security and ultimately reduced the outmigration.

On the other hand there are chances for negative environmental impact towards local biodiversity. Also a few farmers who leased out the land parcels expressed the fear that at times of emergency during financial requirements the land cannot be either sold or mortgaged. Also there are apprehensions that the local socio-cultural milieu is likely to be affected and dismantled in the long run. After careful examination this paper suggests a few points for both the policy makers and the farmer households to have conflict free contract in the project zone.

1. INTRODUCTION

Across the globe attention is being made to go in for green energy production owing its positive environmental implications. In general due to the fast growing nature of economics including India and China the demand for power is increasing manifold and many countries are unable to meet out the demand. In countries like India more than 90 percent of energy is produced based on coal and due to its adverse environmental reasons such countries are moving towards green energy sources like solar, wind and bio-fuel. Tropical countries do have advantage to generate energy from solar and India has been making all its efforts to produce the solar energy on a large scale. However, there are certain impediments like poor research and scientific innovation in developing cost effective solar accessories.

Both the Union and Provinces have been consistently trying to increase the green energy source. Incentives and differential rates of tariff have been in

place to encourage the energy producers and unfortunately the results are not so encouraging. Against this the present paper unfolds various issues on the largest solar plant located in one of the south India state of Karnataka with field level exploration.

2. ANALYSIS & DISCUSSION

Once severely power starved state of Karnataka is to produce excess power through a successful model of Public Private Partnership Solar Power Plant in Pavagada taluk of Tumkur district. Equally it has vast scope for adverse environmental implications. This project has been taken up under the initiative of the Government of India's Ministry of New and Renewable Energy (MNRE) for developing solar farms under Ultra Mega Solar Power Plant. First of its kind, a mega joint venture development project is model for other States, where the solar power radiation is found abundant in the semi-arid tropical region of Tumkur district.

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A huge project with collective participation of farmers, this has taken up a shape now and shortly full potential is to be harvested. The Karnataka Energy Development Ltd (KREDL) and the Solar Energy Corporation of India (SECI) formed a joint venture company viz., Karnataka Solar Power Development Corporation Limited (KSPDCL) in March 2015 and work began from October 2016. KSPDCL followed 'pluck and play' model to implement the project, whereby company arranged leased in land from farmers and obtained necessary approvals for power generation.

The Karnataka state owned KSPDCL successfully convinced local farmers to lease in the farm lands for long duration from 25 to 35 years with annual lease of Rs 21000 per acre during 2015-2016 and the compensation is worked out Rs 23-25 crores per annum. The lease can be extended on mutually agreeable terms and conditions. After five years of the project implementation 5 percent of increment will be given every two years.

Later on behalf of KSPDCL, National Thermal Power Corporation Limited (NTPCL) subleased to six solar power players through auctions for commissioning of solar power farms. The estimated tariff ranges between Rs 4.78 and 4.80 per unit and the price of solar energy is steadily falling¹, due to advancement in science and technology and research and development.

With its natural endowments India is poised to generate 100 GW, solar energy by 2022 to increase the share of renewable energy in power generation to 18.9 percent from the present level of 7 percent (MNRE, 2015). The United Nation's Millennium Development Goal 7 also emphasises to ensure solar energy production as it were green and also sustainable.

This ground mounted solar power plant is to produce 2700 MW from 13000 acres with a huge budget of Rs 16,500 crores and in January 2018, 600 MW power was commissioned and by December 2018, this park will attain full capacity of 2700 MW. Power

generated is connected to power grid station at Madhugiri, 75 kms from the Pavagada solar farm. Karnataka for its initiative towards promoting renewable energy was bestowed with Excellence in Renewable Energy award by the Government of India in 2018. Once the full capacity is realized this project will be the largest in the world.

This is a fitting development as India launched Solar Technology Mission, which helps health centers, educational institutions, boreholes, power plants, street lights and drinking water supply particularly in rural areas. The Indian Prime Minister announced a whopping \$ 1.4 billion as part of its Line of Credit for 27 solar projects in 15 developing countries (Kumaraswami, 2018) on 11.3.2018. Unfortunately there are some inherent difficulties in taking forward this eco-friendly sustainable solar energy power plant in India due to various issues including low power price, slow growth in installing rooftop solar plants, consolidation of land, financing, off take of power, lack of storage facility and higher (Ann, 2018) Goods and Services tax.

For instance, grid connected storage of energy from non-conventional sources like solar and wind is a challenging task as the problems remain that the peak supply of intermittent renewable energy does not always meet demand (Jebraj, 2018). Due to reasons unknown according to industry players, at least nine tenders for grid storage in 2017 have been cancelled by SECI, NTPC and NLC. It is justified on the ground that the cost will escalate for creating storage facility, which may be unattractive to distributors. Added to this, presently the lithium ion cells needed for battery storage are not manufactured in India. The Pavagada solar farm also requires to create storage facility.

On the one hand the Indian Government imposed 70 percent safeguard duty on imported solar modules and panels to protect domestic industry and on the other due to competition among solar power developers, tariff has been declining owing to other proactive policies by the government. Anguished with this the EU and Japan criticised this move and China and Malaysia are the major exporter of solar equipments in to India (Sen, 2018).

3. LOCATIONAL ADVANTAGE

Though there are legal disputes and opposition for acquisition of land for development projects like solar farms the locals here welcomed this project. A tiny town, Pavagada has undulated terrain with meagre annual rainfall of less than 400 mm in 45 rainy days grows crops under rain fed condition. Many farmers and

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² Per unit price of solar power in India is declining and for grid connected large solar plants has decreased below Rs 5 (Sharma, 2015). Now it has gone down to less than Rs 3 per unit.

agricultural labourers eke out income from rearing small ruminants and to supplement farm income. Besides high average solar radiation of 5.35 kWh per square meter per day, availability of large tracts of barren and temporary fallow land and elevated plateau surrounded by rocky hills, this area has been selected.

The state government declared this area as drought hit 54 times during the past 6 decades, which demonstrates the fragile nature of local environment, albeit suitable for solar power plants. According to Central Ground Water Board (GOI, 2011) this region is declared as ground water overexploited and water contains nitrate, chloride and fluoride. As a semi-arid tropical zone with deficit rainfall, less remunerative crops like castor, pulses, minor millets and groundnut are grown only during *mungaru* (kharif) season to normally get below subsistence income. If the rain is erratic (as is the case many times) even the seed cost cannot be recovered. The condition of small, marginal farmers and farm labourers is still worse. Due to poor agriculture income and unemployment, around 1000 youths from this taluk alone migrate to Bangalore and Hyderabad for fulfilling their livelihood security.

Traditionally land owning communities – Vokkaligas, SCs and STs form major social groups as inhabitants here. While the upper caste – Vokkaligas – conventionally possesses vast tracts of farm lands, STs do have some portions of land and SCs have lesser magnitude. SCs normally work as farm labourers besides rearing sheep and goat. The marginalized communities (SCs and STs) form 40 percent of total population in all five projects villages.

4. PROJECT IMPACT

Money received against leased out lands help the locals and transforms the entire lifestyle and consumeristic culture found in the project area. Farmers understood that instead of keeping the land barren and taking up unviable cultivation, it is wise to lease it out. Farmers numbering 629 from Balasamudra, Vallur, Rayacharlu, Kyataganacharlu and Thirumani in Nagamdka Hobli of Pavagada taluk collectively leased it out to KSPDCL. This company also pays as compensation of Rs 2.20 lakhs and 1.20 lakhs for installing high and medium size power transmitting pillars respectively on the farm lands. For installing sub stations, land was also out rightly purchased by the KSPDCL at the rate of Rs 6.6 lakhs per acre from the farmers.

Unlike for other development projects, here farm lands have been leased in by the project authorities without major hassle and officials noted that farmers

have joined with the government as partners, beneficiaries, stakeholders and shareholders. In fact as revealed by Nathan (2015) leasing reduces the solar power cost and makes the affected farmers as 'partners in development'. It is surprising that this project was executed in a record time of two years with full cooperation of local farmers.

After commissioning of this project, as in the case of wind farms in the neighbouring Tamil Nadu, the land value has increased manifold. Complete transformation² has been witnessed in the standard of living. Majority of the farmers invested in purchasing transport vehicles and JCB (earth movers) machines for hiring them out. At present there is a greater demand for them in the solar project farms for carrying out development works. An unskilled worker is paid Rs 250 to Rs 300 as wage depending upon the nature of work. A rough estimate shows that 400 technical manpower and around 1000 semi-skilled jobs are required to upkeep and maintenance of solar farms. A few local youths are employed in the construction and installation of solar power plants and as security guards. Farm households rent out their machineries like tractors, water tankers and JCB machines to level the project sites and cleaning the stones, grass, bushes and grubbing. Nevertheless, if the project was completed they become jobless.

5. CHALLENGES AHEAD

Many villagers fear that they are alienated from farm plots and in the long run it may bring adverse development than economic benefits. Farm labourers and tiny farmers' class in all the five villages are likely to be affected by the project as the grazing land is shrinking and sustainable employment is bleak. There are five irrigation tanks in these villages provide irrigation facilities³ to ayacut areas, when there is a bountiful rain and good storage. Nevertheless, fear is compounding among the villagers that large quantum of water will be drawn from the local irrigation tanks for regularly cleaning the solar panels and other domestic needs.

The Environmental Impact Assessment (EIA, 2016) on the project area estimated that 7 crore litres water is required once in a fortnight to wash the solar photovoltaic panels every time. Moreover, the local

³There is a possibility that when local farmers especially in urban fringes get compensation for the land, money is spent on unproductive consumption expenditure and in short time they become pauper. Contrary to this, locals in project areas are wise in investing their money for productive purpose.

*nallahs*⁴ (forest channels) which facilitated to naturally flow water into irrigation tanks have been either closed or diverted inside the project areas⁵ during grubbing and laying approach roads, which will deprive inflow of rain water. Another issue is that 3 meters depth pits are dug at regular intervals to install the iron rods for fixing the panels and after the lease period, it may be difficult⁶ to clear the concrete from the farm plots and land may become unfit for cultivation as farmers feared.

Fear gripped among people as many become unemployed as entire land has been leased in some households. According to shepherds in Thirumani village the project restricts the movement of livestock for grazing as entire site has been completely fenced and animals were sold out for throw away price. Even poor households who do not have toilets find difficult to go for easing on the open field. A young farmer from ST community from Vallur, who leased out 1.5 acre concurred that 'we feel like alienated from our land' and the aged ones became ideal as they do not know any other work except farming and rearing of livestock.

Farmers worried that contract for lease is a long period and there is a possibility for legal dispute within the household when there is division in the joint family which will lead to conflicts. Conflict between different groups and misunderstanding with solar power players may lead to breakage of SPVs on the one hand and the disposal of debris is yet another environmental problem.

In addition migratory pattern of fauna will be restricted due to establishment of massive solar power structure in water perched Nagamdka Hobli. Close

⁴ Two are larger in size of more than 450 acres and others are less than 250 acres each and receive water from neighboring reserve forests and hillocks.

⁵ Penna river tributaries facilitate rain water drains into local tanks, which pass through blocks 31, 34, 37 and 38 inside the project site. Since free flow of rain water is affected the irrigation tanks will not get their full capacity.

⁶ As the EIA admits "the reduction / alteration of surface water runoff and extraction of ground water are considered as significant adverse impact from the proposed project and permanent in nature".

⁷ According to the EIA there is a safeguard mechanism that the solar farm developing companies should clear the debris, but many leases farmers are suspicious about this.

proximity to this zone at a distance of just 2 kms there is a reserve forest – Ramagiri West Forest Range belongs to neighbouring Andhra Pradesh. A cross section of villagers cautioned that local biodiversity and ecosystem will be affected as already local wild animals like hog, jackal, deer, wolf, rabbit, monitor, chameleon, peacock, bats, snakes, and monkey are distressed and disappearing due to shrinking of habitat. Similarly local plants like broomstick, fruit bearing *hunashe hannu* (tamarind) *nerale hannu* (rose apple), *seetha pala* (custard apple) and *yelleche hannu* (wild ber) have been uprooted during vegetation clearing and grubbing of filed plots inside the project areas. In the process of commissioning the project, many local medicinal plants⁷ and grass once found inside, have been completely cleared now.

The Pavagada solar power plant also creates uneasiness among the farmers on social gatherings and ritual offerings. Earlier whenever there was bumper harvest, (before one week) domestic animals⁸ were sacrificed as there is a belief that it prevents major pests and diseases on crops, animals and human beings. Also community assembling during *Sankranti* (harvest festival) and *Ugadi* (Kannada New Year) to plan and sort out local development issues becomes rare now, 75 year old Narayanappa from Thirumani worried. After the entry of KSPDCL, the land became costlier as it rose to Rs 7 lakhs per acre. Real estate business is entering here hoping that there will be a greater demand for solar power generation in future, which may result in consolidation of land from the farmers by real estate entrepreneurs.

6. CONCLUSION & SUGGESTIONS

This JV project is unique as zero land acquisition to produce green solar energy. Unlike villagers close to cities, here farmers are cautious in investing their money, paid as lease amount in purposeful manner. The local farmers albeit given decent tariff for their leased out lands fear that they will be deprived of their farm lands in the long run. Also there is difficulty for a farmer who wants to sell his land on contingency needs. Now villagers have given up farming and livestock rearing and therefore employment opportunities may be given to local youths depending upon their age and qualifications by establishment of skill academy based on the needs of solar power farms.

⁸ Local shepherds revealed that a few rare plants cure the diseases and digestive system of domestic animals.

⁹ Normally poultry and sometimes sheep were cut and the blood was spread on the field plots as thanksgiving to the God.

Local villagers including farmers who leased out land should form welfare association to bargain with the solar power players during critical times. Frequent meetings by officials with such association would remove the fear among the locals and build confidence. There are successful models of community initiated solar power plants elsewhere in India. The first solar pump irrigation cooperative enterprises has completed two years of functioning in Central Gujarat (Shah and Others, 2017). Confidence building will certainly sustain the eco-friendly solar power farms in the energy poverty Karnataka state.

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